



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/636,162	08/07/2003	Hyeon-Seag Kim	0180124	3602
25700	7590	09/22/2004	EXAMINER	
FARJAMI & FARJAMI LLP 26522 LA ALAMEDA AVENUE, SUITE 360 MISSION VIEJO, CA 92691			FENTY, JESSE A	
			ART UNIT	PAPER NUMBER
			2815	

DATE MAILED: 09/22/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

178

<b>Office Action Summary</b>	<b>Application No.</b>	<b>Applicant(s)</b>	
	10/636,162	KIM ET AL.	
	<b>Examiner</b>	<b>Art Unit</b>	
	Jesse A. Fenty	2815	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 07 August 2003.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 16-20 is/are allowed.
- 6) ☒ Claim(s) 1,3-5,7-9,11-13 and 15 is/are rejected.
- 7) ☒ Claim(s) 2,6,10 and 14 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## DETAILED ACTION

### *Claim Rejections - 35 USC § 103*

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1, 3-5, 8, 9 and 11-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Alvis (U.S. Patent No. 6,293,698 B1) in view of Young (U.S. Patent No. 6,680,484 B1).

In re claims 1 and 9, Alvis discloses a semiconductor test structure comprising:

A first metal line situated in a metal layer of said test structure;

A second metal line situated adjacent and substantially parallel to said first metal line, said second metal line being separated from said first metal line by a first distance;

An interlayer dielectric layer situated between said first metal line and said second metal line.

The limitations, “for determining ... failure” and “wherein said electromigration failure is determined ... line” are recitations of the intended use of the claimed device. Terms that simply set forth the intended use, a property inherent in or a function, do not differentiate the claimed composition of these elements from those known to prior art. The instant claims are directed to a structure patent, not a method of use, which is a separate patentable subject area. If the prior art structure reads on the claims, the intended use of the device does not add features to the claimed subject matter.

Art Unit: 2815

Alvis does not expressly disclose the distance between the metal layers being equal to a minimum design rule separation distance. Young (column 7, lines 30-60) discusses the importance of design rule minimum width between metal layers. It would have been obvious for one skilled in the art at the time of the invention to place the metal layers of Alvis at the minimum design rule width as disclosed by Young for the purpose, for example, of setting the proper width as to determine proper current density variations between metal layers (Young; column 7, lines 57-61).

In re claims 3 and 11, Alvis in view of Young discloses the devices of claims 1 and 9 respectively, wherein said first metal line has a first width and said second metal line has a second width, said first width and said second width being substantially equal to minimum design rule width.

In re claims 4 and 12, Alvis in view of Young discloses the devices of claims 1 and 9 respectively, wherein a current is caused to flow through the metal lines (column 2, lines 31-32) by a voltage applied at either end of the line. Varying the direction of the current flow in routine experimentation would have been obvious to one skilled in the art and does not deem the claim allowable over the disclosed prior art.

In re claims 5 and 13, Alvis in view of Young discloses the devices of claims 1 and 9 respectively, but do not expressly disclose the length of the metal lines. The novelty of the prior art is the structure of the test devices, not the length of the wire. If so, length would have been specifically mentioned. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to determine an optimum distance of the test line,

Art Unit: 2815

since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. *In re Boesch*, 617 F. 2c 272, 205 USPQ 215 (CCPA 1980).

In re claim 8, Alvis in view of Young discloses the device of claim 1, wherein the metal lines are aluminum or copper (Young, column 6, line 1).

3. Claims 7 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Alvis in view of Young as applied to claims 1 and 9 above, and further in view of Uzoh (U.S. Patent No. 6,465,376).

In re claims 7 and 15, Alvis in view of Young discloses the devices of claims 1 and 9 respectively, comprising an interlayer dielectric layer (33) encapsulating the metal layers, but does not expressly disclose the material to be a low-k dielectric. Uzoh discloses a similar device for improving electromigration that discloses the use of low-k silicon dioxide (2) as an interlayer dielectric. It would have been obvious for one skilled in the art at the time of the invention to use a well-known dielectric as disclosed by Uzoh for the device of Alvis/Young for the purpose, for example, of insulating and isolating the metal lines.

#### ***Allowable Subject Matter***

4. Claims 2, 6, 10 and 14 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

5. Claims 16-20 are allowed.

Art Unit: 2815

6. The following is a statement of reasons for the indication of allowable subject matter:

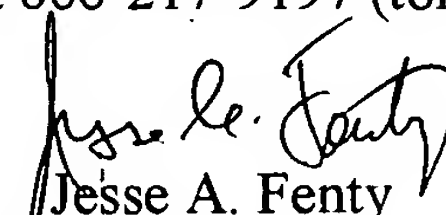
The objected to and allowed claims reciting at least a further metal band that surrounds the first and second metal lines and interlayer dielectric layers being situated between the metal lines and the metal band is neither anticipated nor obvious over the prior art of record.

### *Conclusion*

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jesse A. Fenty whose telephone number is 571-272-1729. The examiner can normally be reached on 5/4-9 1st Fri. Off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Thomas can be reached on 571-272-1664. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

  
Jesse A. Fenty  
Examiner  
Art Unit 2815